Attachment 1-A
Design for Environment (DfE)
Protocol for Demonstration on New Meltshop

A. Introduction

Nucor will demonstrate the Design for Environment (DfE) approach to designing and constructing its next new meltshop. This may be a "greenfield" site or a new meltshop at a new facility. The DfE approach will be a key component of the Nucor EMS and enhance the ability of the Environmental Management System (EMS) over time to mitigate impacts with technology that presently may not be viable but, in the future may become viable. During the three to five year period for implementing and validating the EMS, Nucor will likely upgrade an existing meltshop or construct a new facility. At such time the DfE evaluation will be conducted.

B. Objectives

This project will demonstrate Nucor's approach to DfE analysis and will result in an optimal design for the planned meltshop, subject to constraints of available technology, economic factors, and the requirements of production, quality and environmental regulation.

C. Approach

When a new meltshop is proposed many parameters are evaluated. The conventional approach to the environmental requirements has been to evaluate "what is required to obtain a permit?" In addition to answering this question, Nucor's DfE demonstration for a new meltshop will entail a formal evaluation of the environmental impact of equipment, facility layout and location selection. The results of the DfE investigation will be included as part of the decision-making process along with economic factors (e.g., markets, "financials," transportation, growth estimates), labor, utility, and other essential data that are considered when a facility is sited and built. If Nucor conducts the demonstration for an existing facility, siting considerations will be less relevant than with a greenfield DfE analysis.

The Nucor DfE analytical approach will emphasize the following considerations:

- Optimal electric arc furnace (EAF) design, in light of technology precedents, production requirements, product quality issues, worker safety, economic considerations, environmental regulations, and overall environmental impact;

- Pollution Prevention for EAFs, in light of the protocol for piloting the implementation and evaluation of process modifications on an electric arc furnace;

- Energy conservation and add-on pollution control technology for EAFs, in light of the

  - protocol for piloting the design and operation of Selective Noncatalytic Reduction (SNCR) on an EAF,
  - protocol for evaluating the operation of reduced Nitrogen Oxide (NOx) burners with exhaust gas re-circulation (RNB/EGR) on a reheat furnace,

  - demonstration project for lance burner technology; and

- Evaluation of pollution control technology for the reheat furnaces.

- Evaluation of "reasonable" alternatives. Some alternatives can be eliminated at an early level of review as clearly failing to meet threshold feasibility criteria (such as relocating a facility outside of the target market instead of using a different site within the target market). The "reasonable" alternatives will be evaluated more closely for economic feasibility, technical feasibility, operational performance, operational feasibility and environmental performance.

The DfE analysis will also take into account other potential "critical control points" of significant emission in the meltshop. Activities to be reviewed include release points of the following component operations of the meltshop. Not all of these points will exist in any given meltshop

design. The DfE analysis will examine only those that are applicable to the particular design.

- EAF and applicable operations (slagging, tapping, melting, charging)
- Charge bucket
- AOD
- Ladle preheat & drying
- Tundish preheat & drying
- Alloy trimming station
- Ladle Metallurgy Furnace (LMF)
- Vertical holding stations
- Refractory related emissions
  - tundish , ladle & EAF tearout
  - tundish, ladle & EAF rebrick
- Pour backs
- Emergency conditions such as wash/breakouts (furnace, caster, ladle)
- Shop Fugitives
- Ladle scraping/dumping
- Nozzle lancing
- Miscellaneous torches
- Miscellaneous natural gas comfort heating
- Medical waste/contraband burning/baghouse bags
- Personal Protective Equipment (PPE), grinding swarf, Cutting Emissions

Points of release to the environment from meltshop operations will also be evaluated for other potentially significant environmental impacts, such as discharges to water, disposition to land, and other sources of waste generation and other potential impacts.

The results of the DfE analysis will recorded in a document that defines how the final decision was reached. The document will include the original premise, the aspects that affected the environmental impacts, and the alternatives that were identified and investigated as part of this process. The criteria against which the alternatives were evaluated and final decision of that process will also be recorded in this document.

The final stage of the DfE analysis of a new meltshop will include implementation of the those findings and mitigation options that are appropriate in light of the

analysis. Nucor will produce a report of the analysis, the alternatives implemented and the impact of the implemented alternatives once that information is attainable. Mitigation measures implemented through the DfE process will be integrated with the EMS.

Steps in the DfE analysis, decision process, and coordination with the Operate for Environment (OfE) program are set out in more detail in Attachment 14A.